

# Powered Subwoofer Operation Manual



**MPS-5410**



**MPS-5310**



**MPS-2810**



**MILLER & KREISEL**  
P R O F E S S I O N A L

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The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

**CAUTION**  
**RISK OF ELECTRIC SHOCK**  
**DO NOT OPEN**

**CAUTION:**  
**TO PREVENT THE RISK OF ELECTRIC SHOCK,**  
**DO NOT REMOVE COVER (OR BACK). NO USER-**  
**SERVICEABLE PARTS INSIDE. REFER SERVIC-**  
**ING TO QUALIFIED SERVICE PERSONNEL.**



The lightning flash with arrowhead, within an equilateral triangle, is intended to alert the user of the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

## 1. SAFETY INSTRUCTIONS

1. **READ INSTRUCTIONS** - All safety and operating instructions should be read before this product is operated.
2. **RETAIN INSTRUCTIONS** - The safety and operating instructions should be retained for future reference.
3. **HEED WARNINGS** - All warnings on this product and in the operating instructions should be adhered to.
4. **FOLLOW INSTRUCTIONS** - All operating and use instructions should be followed.
5. **ATTACHMENTS** - Do not use attachments not recommended by the product manufacturer as they may cause hazards.
6. **WATER AND MOISTURE** - Do not use this product near water - for example, near a bathtub, washbowl, kitchen sink, or laundry tub; in a wet basement; or near a swimming pool; and the like.
7. **ACCESSORIES** - Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Use only with accessories recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions and should use a mounting accessory recommended by the manufacturer.
8. **POWER SOURCE** - This product should be operated only from the type of power source indicated on the marking label. If you are unsure of the type of power supply to your home, consult your product dealer or local power company.
9. **OVERLOADING** - Do not overload wall outlets or extension cords as this can result in a risk of fire or electric shock.
10. **LIQUID ENTRY** - Never spill any liquid of any kind on the product.
11. **SERVICING** - Do not attempt to service this product yourself. Opening or removing covers, including any over bottom or side speaker drivers, may expose you to dangerous voltage or other hazards. Refer all service to qualified service personnel.
12. **DAMAGE REQUIRING SERVICE** - Unplug this product from the wall outlet and refer servicing to qualified personnel under the following conditions:
  - When the power-supply cord or plug is damaged.
  - If liquid has been spilled, or objects have fallen into this product.
  - If the product does not operate normally by following the operating instructions. Adjust only controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
  - If the product has been dropped or damaged in any way.
  - When the product exhibits a distinct change in performance - this indicates a need for service.
13. **REPLACEMENT PARTS** - When replacement parts are required be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutions may result in risk of fire, electric shock, or other hazard.
14. **SAFETY CHECK** - Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.
15. **HEAT** - This product should be situated away from heat sources such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat.

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## 2. INTRODUCTION

Congratulations and thank you for purchasing this M&K powered subwoofer. Miller & Kreisel Professional powered subwoofers are designed to provide many years of accurate and problem free operation.

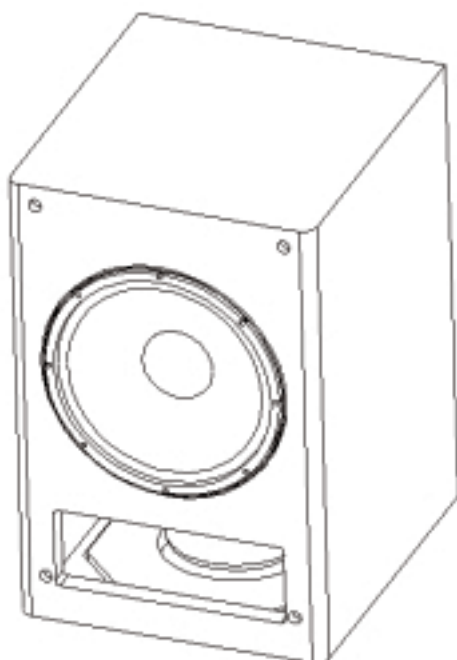
We strongly encourage you to read this owner's manual, as there is a great deal of information provided here to help you get the best possible performance from your new M&K Professional subwoofer.

If you have any questions regarding any Miller & Kreisel Professional products, please contact your M&K Professional Dealer, or call the M&K Professional factory directly at (818) 701-7010, from 8:30 AM to 5:00 PM Pacific Time. We will be more than happy to help you with any question, no matter how simple or complex it may be. Additional information may also be found on our web-site: [www.mkprofessional.com](http://www.mkprofessional.com)

## 3. PACKING LIST

Miller & Kreisel Professional wants your product to work and look as good as the day it left the factory, so please inspect the packaging for any shipping damage, and contact the dealer if the contents are not in perfect condition. Below is a list of items that have been included with your powered subwoofer.

- 1 M&K powered subwoofer
- 1 Six foot IEC power cord
- 1 Operation and setup manual
- 1 Miller & Kreisel Professional audio setup disk
- 1 Product registration card
- 1 Warranty certificate



**M&K Powered Subwoofer**  
(actual unit may differ)



**Setup Disk**



**IEC Power Cord**



**Operation Manual**



**Warranty Card & Certificate**

## 4. M&K'S DESIGN PHILOSOPHY

Our philosophy is that exciting and lifelike sound and music reproduction takes place when your ears, in effect, become the recording microphones. Our speakers are designed to allow you to hear exactly what the microphones heard, placing you as close or as far away from the music or sound source as the recording engineer placed the microphones.

Too many so-called "music" loudspeakers are designed with a philosophy that all recordings should sound as if the music comes from a stage 10 or 20 rows distant, even if a recording is closely miked with performers as close as a few inches from the microphones (as is often done on film soundtracks, especially for dialog).

This "homogenizing" effect may be pleasant for some music recordings, but it inaccurately reproduces both close-miked recordings and those recordings that accurately capture the acoustic space of a recording site. This is why many "music" speakers do so poorly when trying to reproduce both the intensity and intimacy of closely miked sound effects and dialog on today's best soundtracks.

As an audiophile recording engineer and a high-end loudspeaker designer, my strong belief has always been that a good loudspeaker should accurately and realistically reproduce whatever the microphone captured, whether the source is a human voice, a musical instrument, an explosion, car crash, etc; including the acoustical ambiance of the environment in which the source was recorded.

Ken Kreisel  
co-founder and CEO  
M&K Sound Co.

## 5. THE LOGIC BEHIND BASS MANAGEMENT

*OBSERVATIONS by Ken Kreisel*

Engineers mixing multi-channel audio (Stereo, Dolby Surround, 5.1 Dolby Digital, DTS, and other surround-sound formats) are faced with numerous challenges when trying to accurately monitor complex and dynamic material, and determine how this material will sound in its intended playback space. These issues include reproducing 5, 7, or more channels of full range audio, plus an optional Low Frequency Effects channel (LFE), all of which have a bandwidth to 10Hz or below, with very high dynamic range, and achieving consistent bass response from all the channels throughout the control room monitoring area.

Any studio designer will tell you that for a stereo mix environment it is crucial that the left and right monitor speakers, when in their selected studio location, have near identical bass response when measured at the mixer's position. No less is true in multi-channel mixing. Proper low frequency equalization and mixing decisions are difficult, if not impossible, unless all 5.1 or more channels have the same bass frequency response at the mixers listening position.

Due to unavoidable room modes, five or more correctly placed full range speakers, (in even the most perfectly designed studio) will produce dramatically different low frequency characteristics at the mix position. This is especially true for the very crucial center channel speaker. Variations of 10 to 20dB may be measured at frequencies below 80Hz.

When the bass from all the channels is redirected into a single, PROPERLY placed subwoofer, then each and all of the multiple channels exhibits the identical bass response at the listening position, and gives surprisingly even coverage in virtually every control room. Simply stated bass management is putting an electronic bass frequency crossover (typically 80Hz) on all the channels, and redirecting the bass frequencies below 80Hz from each of the channels to a common subwoofer.

By combining a carefully designed low frequency acoustic rolloff of all the main speakers, including the surrounds, and a matching 2nd order electronic filter in the M&K Bass Management Controller, M&K achieves all the theoretical benefits of a 4th order Linkwitz-Riley filter. In addition, to further create a seamless bass managed system, we use only non-ported sealed cabinet designs on all our speakers and subwoofers, eliminating ported speaker phase anomalies which would prohibit smooth transitions at the bass managed crossover frequency.

Another good reason for using bass management in the control room is that even the least expensive Dolby Digital consumer decoder, found in millions of homes, has bass management built in, allowing the bass from all channels to be fed to a single subwoofer. Also, all Home THX systems utilize an 80Hz bass management system. Monitoring with proper bass management in the professional control room insures proper playback translation into the "home theater" environment and into larger spaces such as motion picture theaters.

It is important to understand that Bass Management is done as a function of the monitoring system and in no way affects the actual mix. Full frequency musical content, is assigned or panned around the room via normal console or software operations to the various desired subjective locations such as Left, Center, Right, Left Surround, and so on. This full frequency musical data corresponding to each speaker location channel is stored normally on tape, hard drive, etc.

Bass Management psychoacoustically works because the ear-brain mechanism cannot detect direction at low frequencies, but takes its directional cues from the harmonics of the low frequency sound. In the monitoring process, frequencies below 80Hz are redirected to the subwoofer. Frequencies above 80Hz are sent to the desired speaker. During the hearing process, our hearing mechanism integrates the sound into the correct spatial auditory image.

Bass management is equally suited to all formats from 2-channel stereo to 5.1 and beyond. Indeed, existing control rooms that are doing stereo 2 channel mixes, especially with smaller nearfield monitors placed on the console, can benefit immensely from the correct integration of Bass Management and a subwoofer; because the engineer is now able to hear low frequency anomalies caused by room rumble, microphone stand thumping, breath pops, and other artifacts that cause undesirable actions later in the broadcast, film chain, or DVD Mastering process.

When mixes are intended for theatrical presentation, it is sometimes necessary to use an additional channel for extra low frequency effects or enhancement. This channel is called the LFE or Low Frequency Effects/Enhancements channel. In the control room monitoring environment, the LFE channel, if or when it is used in the mix, is monitored by the same subwoofer used for the regular [L,C,R,LS,RS] channels. M&K Bass Management Controllers have both a 0dB (with unity gain) and +10dB (with 10dB gain) inputs to accommodate any mixing / monitoring situation, as per Dolby specifications.

The M&K Professional Division supplies, at no additional charge, a special CD test disc to assist in the proper setup and calibration of our Bass Management Systems. This disk has pre-filtered and calibrated tracks of noise which allow quick, accurate, and error-free setup of the monitoring environment to the Dolby standard of 85dB SPL, or any other relative reference level, by using an SPL meter.

## **6. QUICK PRODUCT OVERVIEW**

The MPS-2810 provides low-frequency extension in the smallest practical size. With 200 watts of power and M&K's Push-Pull™ Technology. The MPS-2810 provides a powerful, compact, uncompromised solution where space is at a premium.

The MPS-5310 is a 350-Watt powered subwoofer that is certified for THX pm3 applications with reference level output in rooms up to approximately 3000 Cubic Feet in volume (multiple subs can be used for larger room applications).

M&K's MPS-5410 powered subwoofer allows mixers to hear details in low frequency information down to the limits of audibility. With 400 watts of power and M&K's Push-Pull™ Technology, the THX PM3 compliant MPS-5410 is truly the ultimate low frequency reproducer.

M&K Professional subwoofers feature M&K's exclusive Headroom Maximizer Circuit™, which allows the full-uncompressed dynamics of the audio signal to be heard up to the subwoofer's full capacity - while preventing amplifier clipping and distortion. They also feature M&K Professional's Deep Bass™ sealed-box design, which produces significant low-frequency output, with an in-room response flat to frequencies well below 20 Hz. Unlike subwoofers with ported cabinets, which have an extremely sharp roll off (24dB per octave or more) below the lower limit of their "flat" response (this is also referred to as the port's cut-off frequency), M&K Professional subwoofers reproduce bass frequencies below 20Hz with excellent transient response, accuracy and an authority that other subwoofers cannot match.

Your Subwoofer has a protection circuit that protects it from overheating. After hours of continuous operation at extremely high volume levels, this circuit may kill the power to the Subwoofer. When it activates, the sound may switch in and out rapidly, with a fluttering sound. If this happens, unplug the unit and let it sit for at least half an hour. After that time, plug it back in. It should operate normally. If you find this happens frequently, contact the factory for advice.

## **7. SUBWOOFER PLACEMENT**

Perhaps the most challenging aspect of tuning a subwoofer/satellite monitor system is finding the best place to put the subwoofer in the listening room. Each room exhibits unique characteristics and challenges because of the wide range of size, shape, building materials and equipment in the room.

M&K Professional subwoofers will deliver excellent performance located virtually anywhere in your studio. They are designed so that their output is not localizable when used with proper bass-management electronics. Therefore, there is no need to place your subwoofer either between your main speakers or in any specific location, other than the one that offers the best spectral response.

## Methodology For Placing Subwoofers

The low frequency response and efficiency of a subwoofer are heavily influenced by the acoustics of the playback environment. More specifically, the response is influenced by the room's dimensional ratios, types of construction and location of the subwoofer within that environment. You can significantly improve the subwoofer's in-room response and efficiency by experimenting with various subwoofer placements until you find an optimum location.

Here are a few guidelines for placing the subwoofer in your room.

- *Every acoustic space is unique and experimentation is an important key to finding the best possible location in your particular environment.*
- *A subwoofer becomes more acoustically efficient (has greater output) as you move it closer to a room surface.*
- *A subwoofer will give maximum output and maximum acoustic excitement when it is located in a corner.*
- *Under certain acoustic conditions corner locations are optimum; in others they can excite multiple room modes, producing "muddy" or "boomy" sound.*

As you walk around your room, be sure to pay careful attention to where the spectral response is smoothest and has the greatest low frequency extension. Pay special attention to the corners and along the walls. Remember, because the subwoofer is basically omni-directional, the best spot for the subwoofer may be next to, or behind, the main monitoring area.

It has been found that a subwoofer's in-room response can sometimes be improved by facing the drivers towards a wall. Typically, when you place the subwoofer near a wall the sound will couple with the wall and create an extra 3dB of gain. Place the subwoofer in a corner and you will pick up additional 3dB of gain. Again, experimentation is the key to finding the best possible location.

An effective way to find the best location for the subwoofer is to start out by placing the subwoofer at the listening position. Connect an audio source to the input of the subwoofer and play music with good low-end content through the subwoofer. While the music is playing, move around the room in areas that you think might be good locations for the subwoofer's final placement. Try to locate an area that responds well to the music being played by the subwoofer. Listen for even, well-defined, low frequency response. Once you have settled on a possible placement, move the subwoofer to that location. Experiment with aiming the subwoofer directly at the console, or aiming it at a wall or even aiming it along a wall. Once you have found a good placement solution for the subwoofer, play program material that you are familiar with through the satellites and subwoofer and check the sound quality. Two-channel material is good for this as the imagery of the phantom center depends upon equal volume from both channels and phase coherency of the satellites with the subwoofer.

M&K subwoofers generate tremendous energy, so they may vibrate objects close to it. If you hear buzzing or vibrating objects, make sure to dampen those objects. Rattling, buzzing and other sympathetic resonances can make the subwoofer localizable and therefore should be avoided. Using a sine wave generator can be helpful in locating these acoustic anomalies.

### MPS-2810 SPECIAL INSTALLATION NOTES

An enclosed hardware kit contains four black metal spikes, threaded at one end and tapering to a sharp point at the other. By mounting these spikes into the threaded inserts mounted in the bottom of the Subwoofer, you can elevate the Subwoofer, and on carpet, couple it more tightly to that floor. **Do not use the spiked feet on hardwood or tile floors. They can damage the floor surface.**

The threaded inserts are found in the four corners of the cabinet's bottom. The inserts are 1/4 - 20, that is, 1/4 inch in diameter and 20 threads per inch. This is compatible with the most spikes, "cones," "tip-toes," etc. offered by manufacturers of specialized speaker feet.

To properly secure the feet to the cabinet, you must use the provided washer and jamb nut on the threaded portion of the foot. The washer goes first, with the nut over it, holding the washer securely in place. This prevents damage to the spike and the threaded insert in case something moves the cabinet sideways.

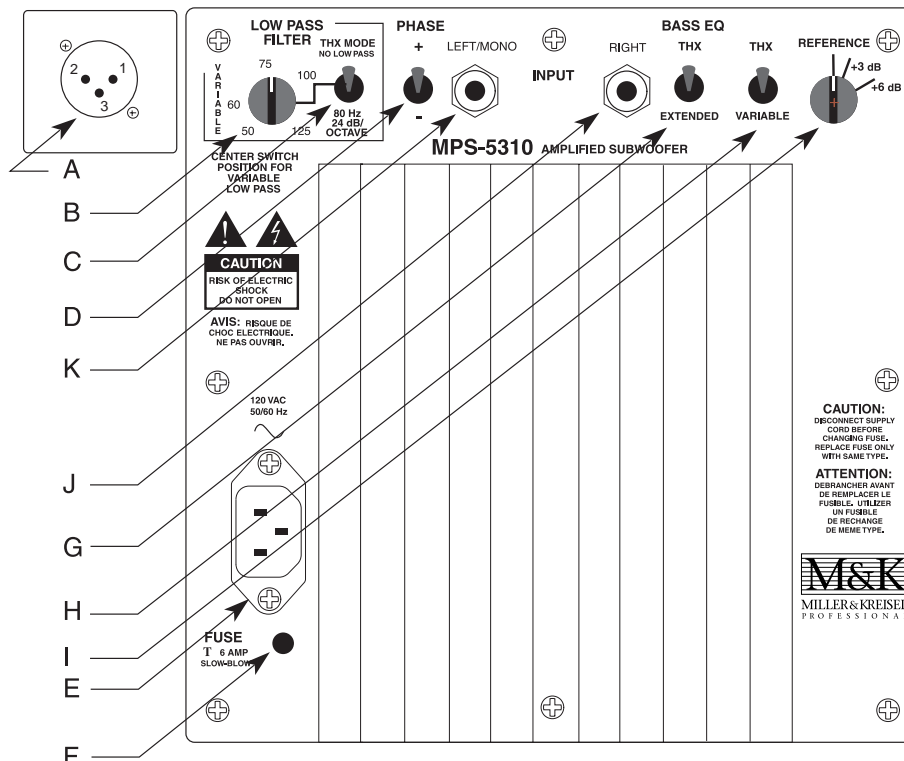
The MPS-2810's pressure-loaded design allows for maximum coupling to a room because it places its drivers directly adjacent to room surfaces, whether the cabinet is horizontally or vertically oriented. Feel free to orient the cabinet either way. When vertical, its tall thin look is very attractive, and gives excellent performance when the subwoofer is in a corner.

The cabinet's 17" width allows the MPS-2810 to be rack mounted for professional applications or installations where space is at a premium. If you want to do this, contact M&K for a rack-mounting kit.



## 8. INPUTS AND CONTROLS

(MPS-5310 SHOWN AND SHOULD BE USED FOR REFERENCE ONLY, CONTROLS MAY NOT APPLY TO ALL MODELS)



A) **Mono Balanced Input** - 61K Ohms balanced input connector - 200mv in produces 90dB of output (Reference/THX input sensitivity mode).

Pin Polarity:

1. Ground
2. Plus
3. Minus

B) **Variable Low-Pass Filter** - 50Hz to 125Hz, 36dB per octave low-pass filter. This optional adjustment is activated by setting the 3-way toggle switch located to the right of this knob to the center position.

C) **3-way Low-Pass Filter Toggle Switch** - In the THX position of the switch the low-pass filter of the subwoofer is bypassed. This mode should be used when operating the subwoofer with an external bass-management box or consumer Dolby Digital/THX receiver/decoder. In the center position, this switch activates the variable low-pass filter (B). The bottom position of this switch activates an 80Hz, 24dB per octave filter. This mode should not be used when the subwoofer is being connected to an external bass management box.

D) **Phase Switch** - Allows the subs phase to be changed between 0 degrees and 180 degree out of phase so as to best accommodate subwoofer location and crossover performance with regards to the main speakers.

E) **Standard IEC Power Cord Receptacle**

F) **Fuse Holder**

110 Volt (US) External Fuse  
220 Volt (US) External Fuse  
220 Volt (IEC 127-2III) External Fuse  
Internal Fuse (all versions)

6.0 Amp 3AG - 1/4" x 1 1/4" Slow-Blow  
3.0 Amp 3AG - 1/4" x 1 1/4" Slow-Blow  
T 3.15 A 5 x 20 mm Time-Lag  
7.0 Amp 3AG - 1/4" x 1 1/4" Fast-Blow

G) **Bass EQ Switch -**

*THX Position*

- 3dB at 35Hz (*anechoic*)
- +/-1dB pass band (40Hz to 150Hz)
- 3dB at 200Hz

Rooms that are below 6,000 Cubic feet in volume typically have a rising characteristic below 35Hz. When the subwoofer is used in rooms of this size or smaller, the subwoofer should be set in the THX position for flat in-room response.



*Anechoic Position-*      3dB at 20Hz (*anechoic*)  
                                      +/-1dB pass band (40Hz to 150Hz)  
                                      -3dB at 200Hz

In this position the subwoofer has the greatest low frequency extension and in small rooms often provides a rising characteristic below 35Hz.

- H) **Input Gain Switch** - In THX mode, the gain is fixed and provides 90dB of output when a 200mv signal is applied to the balanced input (100mv unbalanced).
- I) **Variable Gain Knob** - Variable gain knob provides gain settings from  $-\infty$  to approximately +20dB above reference. Reference is equal to the input gain switch being set to the THX position.
- J) **Right Un-balanced Input** - 15K Ohms balanced input connector - 100mv in produces 90dB of output (Reference/THX input sensitivity mode)
- K) **Left /Mono Un-balanced Input** - 15K Ohms balanced input connector - 100mv in produces 90dB of output (Reference/THX input sensitivity mode)

## 9. RESPONSE AND SENSITIVITY ADJUSTMENTS

M&K Professional subwoofers feature user adjustable response, sensitivity and crossover adjustments in order to allow for easy integration into any monitoring system or acoustical space. Make sure to use the settings that best match your specific components so that double filtering does not occur and that the most accurate response is achieved.

### Using your M&K subwoofer with External Bass-Management Electronics

The following is an overview of how the subwoofer should be connected when used with an external bass-management system, such as the M&K Professional LFE-4 or LFE-5. These guidelines should also be followed when the subwoofer is used with a consumer Dolby Digital or THX decoder.

Connect the subwoofer output from your bass-management box directly to either the XLR input of the subwoofer or the mono-unbalanced RCA input. Since all the bass-management filtering is being done externally, the internal low pass filter should be set to THX mode so it is bypassed.

The phase switch should be set to whichever mode yields the smoothest response at crossover. This can be confirmed by using a spectral analyzer, or by listening tests.

Bass EQ should be set to whichever mode yields the flattest low frequency response. Typically, because of a phenomenon known as room gain, it has been found that the THX mode yields the flattest in-room response. This mode also yields the maximum headroom.

If additional low frequency extension is required, the subwoofer can be switched to its extended mode, which typically results in a rising characteristic below 30Hz, when measured in room.

Because most external bass-management boxes provide their own output adjustment for the subwoofer, it is recommended that the subwoofers input gain switch be set to THX mode. This mode is equal to the reference setting on the variable gain knob.

### Additional Suggestions Regarding Low-Pass Filter Settings

The MPS-5310 features an adjustable 36dB per octave, variable low-pass filter. This filter can be useful when using this subwoofer with non M&K Professional monitors so as to help provide a perfect match at crossover between the main speaker(s) and the subwoofer.

The low-pass filter should be set to the 24dB/80Hz filter setting when using the an M&K Professional subwoofer with a bass-management controller that does not have a low-pass filter (such as the M&K LFE-4, LFE-5 and BMC-Mini).

## 10. CALIBRATING YOUR M&K PROFESSIONAL SYSTEM

1. For this set-up procedure, you will need the following:

- a.) An SPL meter. Radio Shack has an analog SPL meter that is very effective and not expensive.
- b.) The M&K Professional test CD.

- c.) A small, flat bladed screwdriver (or “tweezer”) to adjust the channel trim pots on the LFE-4.
- d.) A CD player, or DVD player that can play CD-R’s.
- e.) An M&K speaker system with the LFE-4 Bass Management Controller.

2. It may be helpful to have one person sit at the listening position and read the meter while another person adjusts the trim pots on the LFE-4.

3. When the slot of the channel trim pots on the LFE-4 are pointing straight up and down, the gain of each of the channels is approximately 0dB or unity. The trim pots have a plus or minus 12dB gain range. Rotating the pot counter-clockwise will attenuate the channel a maximum of –12dB and rotating the pot clockwise will boost the channel gain a maximum of +12dB. The maximum output of the LFE-4 is + 27dBu. With a nominal signal level of + 4dB with 20dB of headroom, the maximum signal level from the source (console, etc.) can be + 24dB. Therefore, at very high signal levels you can only add around + 3dB of gain with the trim pots before the signal chain of the LFE-4 overloads. If you need more than 3dB of gain at high signal levels, it is better to increase the output of power amplifiers and use the trim pots on the LFE-4 to reduce the gain.

### **The M&K Professional test disc**

Ken Kreisel has designed this test disc expressly for use with M&K satellite/subwoofer loudspeaker systems. The tones on this disc are all bandwidth-limited Pink noise. This is to avoid room anomalies and therefore provide a more accurate calibration. By using this disc with a Radio Shack SPL meter and following the instructions in this manual, you can achieve a remarkably accurate system calibration.

The goal here is not to find an absolute SPL level, but to balance the SPL level of all channels relative to each other. For this application, the Radio Shack SPL meter will work very well.

If a more accurate calibration is desired, we recommend using a real time analyzer with calibrated microphones and appropriate room analyzing software.

#### ***Following are the tones found on the M&K test disc:***

Track one: Band limited Pink Noise from 500Hz to 3kHz recorded at –20dB FSD. Use this tone to calibrate your main and surround (satellite) speakers.

Track two: Band limited Pink noise from 40Hz to 80Hz recorded at -20dB FSD. Use this tone to adjust your subwoofer level.

Track three: 1 kHz sine wave recorded at –20dB FSD. Use this to set the reference level of your source (console, etc.) On an analog console this will be 0VU. On digital sources this will be either –20dB FSD or –18dB FSD.

## **11. SPEAKER CALIBRATION**

1. Your speakers should now be in their final positions.
2. Remove all EQ and signal processing from the monitor path.

3. Turn all volume controls in the signal chain to their “reference level” position. These volume controls include the console main monitor pot, submaster faders and power amplifier volume pots. The “reference level” position is your defined reference playback level, which is typically 85dB SPL for film, video and music. For the purposes of this discussion, we will assume that 85dB SPL is your reference level. If you use a different reference level, then substitute the level that you use whenever you see 85dB SPL.

4. Transfer one channel only (left or right) of the M&K Professional test CD onto your audio storage medium (Pro Tools, open reel recorder, etc.). It is important that the tones be played back from your source through the normal routing of your console or Pro Tools system so that the system calibration is conducted through the same signal path that your audio goes through.

5. Select track three on the test CD and use the 1kHz tone to level-set your console for 0VU on an analog console, or –18 FSD if working digitally. Do not move the faders once you have level-set your monitor path.

6. Select track one on the test CD and route it to the speaker that you want to calibrate (for example: left front).

7. Set your SPL meter for C weighting (flat) and slow (average) response. Set the scale to 80dB. Hold the meter at about a 45 degree angle to vertical and at arm’s length to avoid a false reading from sound bouncing off your body and into the microphone. Point the meter at the center speaker at about ear height. Play track one of the test CD through the selected speaker and read the SPL. Adjust the level to 85dB using a small screw driver on the trim pot on the selected channel of the LFE-4.

8. Do the same for all front (or main) speakers and point the meter at each speaker in turn. The meter's microphone is directional.

9. Do the same for the surround speakers (Note: the film community prefers to use 82dB as the reference level for surround speakers while DVD authors, broadcasters and music mixers prefer to set all their speakers, including the surrounds, to the 85dB standard.)

(NOTE 1: if you are using a Martinsound MultiMax, connect the LFE-4 to the output of the MultiMax and disengage the "Redirect" program on the MultiMax as this program is not a bass management program).

(NOTE 2: if your speakers are moved, it is recommended that the whole system be re-calibrated.)

## 13. SUBWOOFER CALIBRATION

1. Set your SPL meter for C weighting and slow response. Set the scale to 80dB. Point the meter at the center speaker at ear height with the meter at a slightly up-turned angle. Play track two of the test CD through the selected speaker and read the SPL (Remember that the LFE-4 will re-route all frequencies below 80 Hz to the subwoofer.) Adjust the subwoofer level using a small screw driver to 85dB on the subwoofer trim pot on the LFE-4.

2. Next, route track two on the TEST CD to each of the 5 channels. Make sure that the subwoofer level is exactly 85dB SPL for all channels. If they are not, you may have a frequency response problem in the signal path that will have to be corrected before proper calibration can be achieved.

## 14. THE FOUR MAJOR ADVANTAGES OF USING BASS MANAGEMENT OVER "FULL RANGE" SPEAKERS

### **Most "full-range" speakers do not go down to 20 Hz.**

Most "full-range" speakers (even those with dual 12" or dual 15" drivers) in reality have a low frequency cutoff in the range of 40 to 50 Hz. This puts them about an octave short of the low frequency response of an M&K Professional subwoofer. Because these speakers are the standard that is used in many studios, many modern stereo recordings have bass information below 40 Hz that the recording engineer never heard. When these recordings are played back on a properly calibrated multichannel audio system, the music sounds bass heavy or even worse has information in the sound track that was never intended to be there, such as noise, equipment hum or other artifacts.

### **Satellite speakers are smaller and can fit in more places than "full range" speakers**

Unlike two-channel stereo, multichannel audio requires that speakers be placed in very specific locations. In video post it means placing speakers close to the sides and on top of the video monitor. In Telecine, it means fitting the center channel speaker inside a light cove. In situations where near-field monitoring is required, it can mean three speakers sitting on the console. Additionally, the surround speakers are two or more speakers that need to be located at least 2 feet above seated ear height on the wall above your head. Full range speakers are generally too big and / or too heavy for most of these applications.

### **Bass Management is the defacto standard in the home.**

Virtually all multichannel home theatre systems, whether they are Dolby Digital, THX or DTS, employ processors with bass management and use five small satellite speakers and a subwoofer. A properly set-up satellite-subwoofer monitor system that includes a bass management controller will ensure accurate translation of work done in the studio to the listener at home.

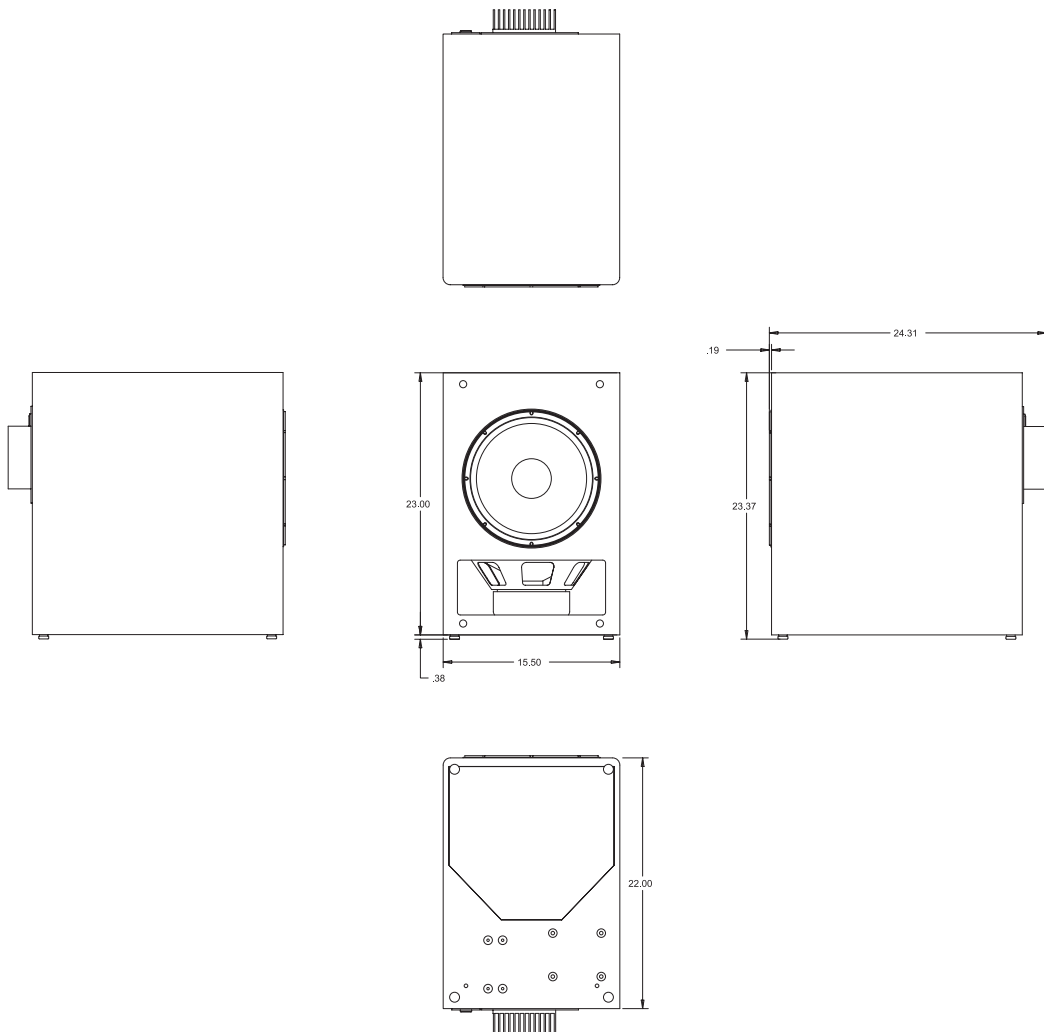
### **One subwoofer in the correct location of given room will out perform the bass output of five full range speakers.**

In small rooms the frequency response of a speaker below 100 Hz is heavily dependent on both the modes of the room and the position of the speaker relative to the listener. (A simple test is to place a subwoofer in the listening position and walk around the boundaries of the room. The bass response will dramatically change from position to position.) The modal response and the position sensitivity makes it virtually impossible to get the bass response of 5 full-range speakers consistent. However, it is much easier to find the best place in a room to place a subwoofer to give the flattest frequency at the listening position.

## 15. SPECIFICATIONS

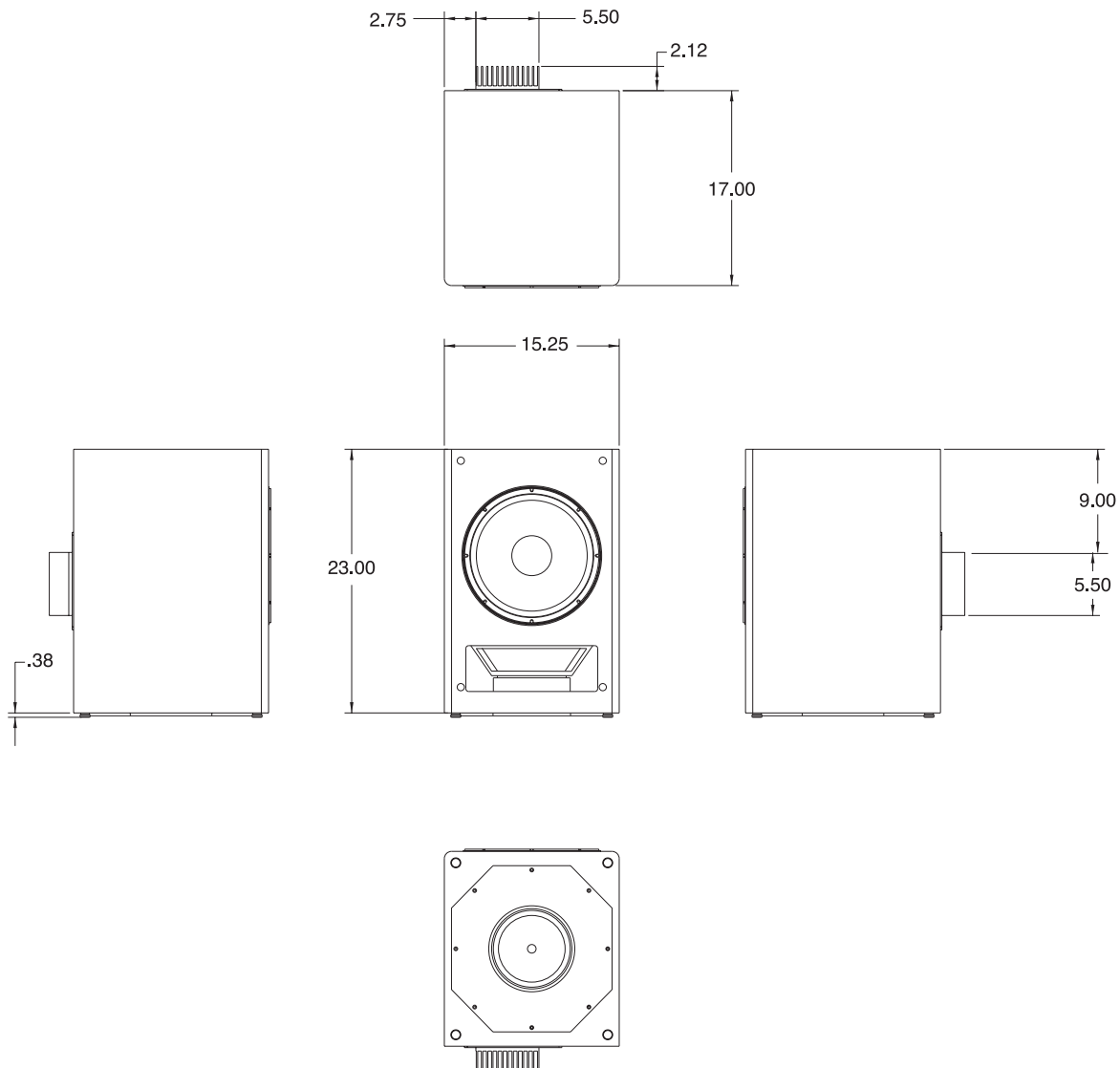
### MPS 5410 (THX PM3 APPROVED)

<b>DRIVER COMPLEMENT</b>	2 X 12" ACRYLIC POLYMER COATED CELLULOSE FIBER
<b>CABINET TYPE</b>	SEALED ENCLOSURE, INVERTED PUSH-PULL
<b>RATED POWER OUTPUT</b>	400 WATTS
<b>PEAK POWER OUTPUT</b> (20 millisecond pulse)	550 WATTS
<b>AMPLIFIER DISTORTION</b>	< .03% AT FULL OUTPUT FROM 20 HZ TO 125 HZ
<b>AMPLIFIER NOISE</b> (relative to full output)	- 90 db
<b>TYPICAL ROOM RESPONSE</b>	20 HZ – 200 HZ +/- 2db (THX POSITION)
<b>ANECHOIC RESPONSE</b>	18HZ – 125 HZ +/- 2 db (ANECHOIC POSITION)
<b>INPUT IMPEDANCE</b>	
BALANCED	30 K OHMS
UNBALANCED	15K OHMS
<b>LOW PASS FILTER</b>	
fixed	80Hz / 24db PER OCTAVE SLOPE (4th order Linkwitz-Riley)
variable	55Hz - 125Hz



## MPS 5310 (THX PM3 APPROVED)

<b>DRIVER COMPLEMENT</b>	2 X 12" ACRYLIC POLYMER COATED CELLULOSE FIBER
<b>CABINET TYPE</b>	SEALED ENCLOSURE, INVERTED PUSH-PULL
<b>RATED POWER OUTPUT</b>	350 WATTS
<b>PEAK POWER OUTPUT</b> (20 millisecond pulse)	480 WATTS
<b>AMPLIFIER DISTORTION</b>	< .03% AT FULL OUTPUT FROM 20 HZ TO 125 HZ
<b>AMPLIFIER NOISE</b> (relative to full output)	- 90
<b>TYPICAL ROOM RESPONSE</b>	20 HZ – 200 HZ +/- 2db (THX POSITION)
<b>ANECHOIC RESPONSE</b>	18HZ – 125 HZ +/- 2 db (ANECHOIC POSITION)
<b>INPUT IMPEDANCE</b>	
BALANCED	15 K OHMS
UNBALANCED	15K OHMS
<b>LOW PASS FILTER</b>	
fixed	80Hz / 24db PER OCTAVE SLOPE (4th order Linkwitz-Riley)
variable	55Hz - 125Hz



## MPS 2810

**DRIVER COMPLEMENT**  
**CABINET TYPE**

2 X 8" ACRYLIC POLYMER COATED CELLULOSE FIBER  
SEALED ENCLOSURE, INVERTED PUSH-PULL

**RATED POWER OUTPUT**  
**PEAK POWER OUTPUT**

200 WATTS

(20 millisecond pulse)

360 WATTS

**AMPLIFIER DISTORTION**

< .03% AT FULL OUTPUT FROM 20 HZ TO 200 HZ

**AMPLIFIER NOISE**

(relative to full output)

- 90 db

**TYPICAL ROOM RESPONSE**  
**ANECHOIC RESPONSE**

30 HZ – 200 HZ +/- 2db (THX POSITION)

22 HZ – 125 HZ +/- 2 db (ANECHOIC POSITION)

**INPUT IMPEDANCE**

*BALANCED*

15K OHMS

*UNBALANCED*

15K OHMS

**LOW PASS FILTER**

*fixed*

80Hz / 24db PER OCTAVE SLOPE (4th order Linkwitz-Riley)

*variable*

55Hz - 125Hz

